

TIME VARIATIONS OF THE NUMBER CONCENTRATIONS OF AEROSOL PARTICLES IN WEST GREENLAND (ABSTRACT)

Katsuhiko KIKUCHI¹, Takashi TANIGUCHI² and Hiroshi UYEDA¹

¹*Department of Geophysics, Faculty of Science, Hokkaido University, Sapporo 060*

²*Hokkaido Branch, Japan Weather Association, Sapporo 060*

Observations of aerosol particles and gases were made in the Arctic in order to clarify the conditions of aerosol particles from the viewpoint of the global environment. Most of these observations were analyses from bulk samples of aerosol particles or gases. Only a small number of observations have been made of the number concentration of atmospheric aerosol particles in the Arctic. They measured the total number concentration alone of aerosol particles, using a Gardner counter. Measurements of the number concentrations of aerosol particles in various size ranges have not been made to date. The measurements of the number concentrations of aerosol particles in five size ranges (0.3–0.5 μm , 0.5–1 μm , 1–2 μm , 2–5 μm , and >5 μm in diameter) using a particle counter (Type KC-01B) made by Rion Co, Ltd. were carried out at Godhavn (69°15'N, 53°34'N), west Greenland, from the middle of December 1989 to the end of January 1990.

The number concentrations of aerosol particles larger than 0.3 μm were less than 10 particles per cm^3 in the lowest level, and this value was one half to one fifth of values which have been measured at Inuvik, Arctic Canada and at Alta, northern Norway.

When the fluctuations of the number concentrations were very small, the mainland of Greenland was covered by a high pressure and a weak downslope wind was blowing from the inland ice sheet where the altitude is up to 3000 m ASL. There was also a strong northeasterly wind accompanied by an abrupt rise of air temperature from -12°C to $+5^\circ\text{C}$. Together with these changes, the number concentrations of aerosol particles for smaller size ranges decreased by about one order suddenly, and particles larger than 5 μm in diameter increased at the same time. These variations are considered to be caused by a strong Foehn phenomenon. Under such phenomena, a well-developed low pressure cell passed northeast along the southern coast of Greenland. The wind circulated around this low pressure, that is, from the east to the west coast of Greenland, overriding the inland high plateau. This might have caused the higher temperature and strong wind on the west coast. It is considered that the smaller particles were blown off by the strong easterly winds which came from the high plateau of Greenland. Generally speaking, the inland and high altitude air is very clean, and in addition, in some cases clean upper air is drawn to the ground surface by hydrodynamic effects. The increase of the number concentrations for larger particles might be caused by the strong wind blowing up soil particles from the ground or bare rocks nearby.

After the Foehn ceased, weak southerly winds blew accompanied by high number concentrations of aerosol particles especially for particles 1–2 μm in diameter. Many sea salt particles were brought from the ocean in the south to the observation site by these southerly winds. Most particles in such conditions were composed of sea salt elements as confirmed by TANIGUCHI *et al.*

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